

20010-06USA_Sequence_Listing.txt
SEQUENCE LISTING

<110> POSCO
POSTECH Foundation
CHA, Hyung Joon
HWANG, Dong Soo

<120> Mussel Bioadhesive

<130> 20010-06USA

<140> US 10/

<141> 2006-09-20

<150> PCT/KR2005/000888

<151> 2005-03-25

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<213> Artificial Sequence

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<223> primer

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<211> 29

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<223> primer

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gtagatctat acgccggacc agtgaacag

29

<210> 3

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<400> 3

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21

<210> 4

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<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 4
aaaaacagcg gaaaatacaa g 21

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<211> 228
<212> DNA
<213> Mytilus galloprovincialis

<220>
<221> CDS
<222> (1)..(228)
<223> Mytilus galloprovincialis foot protein-5 cDNA

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Ser Ser Glu Glu Tyr Lys Gly Gly Tyr Tyr Pro Gly Asn Thr Tyr His
1 5 10 15

tat cat tca ggt ggt agt tat cac gga tcc ggc tat cat gga gga tat 96
Tyr His Ser Gly Gly Ser Tyr His Gly Ser Gly Tyr His Gly Gly Tyr
20 25 30

aag gga aag tat tac gga aag gca aag aaa tac tat tat aaa tat aaa 144
Lys Gly Lys Tyr Tyr Gly Lys Ala Lys Lys Tyr Tyr Tyr Lys Tyr Lys
35 40 45

aac agc gga aaa tac aag tat ctg aag aaa gct aga aaa tac cat aga 192
Asn Ser Gly Lys Tyr Lys Tyr Leu Lys Lys Ala Arg Lys Tyr His Arg
50 55 60

aag ggt tac aag aag tat tat gga ggt ggt agc agt 228
Lys Gly Tyr Lys Lys Tyr Tyr Gly Gly Ser Ser
65 70 75

<210> 6
<211> 76
<212> PRT
<213> Mytilus galloprovincialis

<400> 6
Ser Ser Glu Glu Tyr Lys Gly Gly Tyr Tyr Pro Gly Asn Thr Tyr His
1 5 10 15

Tyr His Ser Gly Gly Ser Tyr His Gly Ser Gly Tyr His Gly Gly Tyr
20 25 30

Lys Gly Lys Tyr Tyr Gly Lys Ala Lys Lys Tyr Tyr Tyr Lys Tyr Lys
35 40 45

Asn Ser Gly Lys Tyr Lys Tyr Leu Lys Lys Ala Arg Lys Tyr His Arg
50 55 60

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Lys Gly Tyr Lys Lys Tyr Tyr Gly Gly Gly Ser Ser
65 70 75

<210> 7
<211> 180
<212> DNA
<213> mytilus edulis

<220>
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<222> (1)..(180)
<223> 6 times repeated sequence derived from mytilus edulis foot protein-1

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gct aaa ccg tct tac ccg ccg acc tac aaa gca aaa ccc tcg tac cca 48
Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro
1 5 10 15

ccg act tat aag gct aaa cct agc tat cca cct acg tac aaa gct aaa 96
Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys
20 25 30

ccg tct tac ccg ccg act tac aaa gca aaa ccg tcc tac cct ccg acc 144
Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr
35 40 45

tat aag gct aaa ccg agt tac ccc ccg act tac aaa 180
Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys
50 55 60

<210> 8
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<213> mytilus edulis

<400> 8
Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro
1 5 10 15

Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys
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Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr
35 40 45

Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys
50 55 60

<210> 9
<211> 411
<212> DNA
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<223> Bioadhesive protein(mgfp-150) coding sequence

<220>

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<221>    CDS
<222>    (1)..(411)
<223>    Bioadhesive protein(mgfp-150)

<400>      9
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  1                    5                    10                    15

ccg act tat aag gct aaa cct agc tat cca cct acg tac aaa gct aaa      96
Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys
      20                    25                    30

ccg tct tac ccg ccg act tac aaa gca aaa ccg tcc tac cct ccg acc      144
Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr
      35                    40                    45

tat aag gct aaa ccg agt tac ccc ccg act tac aaa agt tct gaa gaa      192
Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ser Ser Glu Glu
      50                    55                    60

tac aag ggt ggt tat tac cca ggc aat tcg aac cac tat cat tca ggt      240
Tyr Lys Gly Gly Tyr Tyr Pro Gly Asn Ser Asn His Tyr His Ser Gly
      65                    70                    75                    80

ggt agt tat cac gga tcc ggc tac cat gga gga tat aag gga aag tat      288
Gly Ser Tyr His Gly Ser Gly Tyr His Gly Gly Tyr Lys Gly Lys Tyr
      85                    90                    95

tac gga aag gca aag aaa tac tat tat aaa tat aaa aac agc gga aaa      336
Tyr Gly Lys Ala Lys Lys Tyr Tyr Tyr Lys Tyr Lys Asn Ser Gly Lys
      100                   105                   110

tac aag tat cta aag aaa gct aga aaa tac cat aga aag ggt tac aag      384
Tyr Lys Tyr Leu Lys Lys Ala Arg Lys Tyr His Arg Lys Gly Tyr Lys
      115                   120                   125

aag tat tat gga ggt agc agt gaa ttc      411
Lys Tyr Tyr Gly Gly Ser Ser Glu Phe
      130                   135

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<210>    10
<211>    137
<212>    PRT
<213>    Artificial Sequence

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<400>      10
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  1                    5                    10                    15

Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys
      20                    25                    30

Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr
      35                    40                    45

Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ser Ser Glu Glu
      50                    55                    60

Tyr Lys Gly Gly Tyr Tyr Pro Gly Asn Ser Asn His Tyr His Ser Gly
      65                    70                    75                    80

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Gly Ser Tyr His Gly Ser Gly Tyr His Gly Gly Tyr Lys Gly Lys Tyr
      85      90      95
Tyr Gly Lys Ala Lys Lys Tyr Tyr Tyr Lys Tyr Lys Asn Ser Gly Lys
      100      105      110
Tyr Lys Tyr Leu Lys Lys Ala Arg Lys Tyr His Arg Lys Gly Tyr Lys
      115      120      125
Lys Tyr Tyr Gly Gly Ser Ser Glu Phe
      130      135

<210>      11
<211>      411
<212>      DNA
<213>      Artificial Sequence

<220>
<223>      Bioadhesive protein(mgfp-051) coding sequence

<220>
<221>      CDS
<222>      (1)..(411)
<223>      Bioadhesive protein(mgfp-051)

<400>      11
agt tct gaa gaa tac aag ggt ggt tat tac cca ggc aat tcg aac cac      48
Tyr Ser Glu Glu Tyr Lys Gly Gly Tyr Tyr Pro Gly Asn Ser Asn His
      1      5      10      15
tat cat tca ggt ggt agt tat cac gga tcc ggc tac cat gga gga tat      96
Tyr His Ser Gly Gly Ser Tyr His Gly Ser Gly Tyr His Gly Gly Tyr
      20      25      30
aag gga aag tat tac gga aag gca aag aaa tac tat tat aaa tat aaa      144
Lys Gly Lys Tyr Tyr Gly Lys Ala Lys Lys Tyr Tyr Tyr Lys Tyr Lys
      35      40      45
aac agc gga aaa tac aag tat cta aag aaa gct aga aaa tac cat aga      192
Asn Ser Gly Lys Tyr Lys Lys Leu Lys Lys Ala Arg Lys Tyr His Arg
      50      55      60
aag ggt tac aag aag tat tat gga ggt agc agt gaa ttc gct aaa ccg      240
Lys Gly Tyr Lys Lys Tyr Tyr Gly Gly Ser Ser Glu Phe Ala Lys Pro
      65      70      75      80
tct tac ccg ccg acc tac aaa gca aaa ccc tcg tac cca ccg act tat      288
Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr
      85      90      95
aag gct aaa cct agc tat cca cct acg tac aaa gct aaa ccg tct tac      336
Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr
      100      105      110
ccg ccg act tac aaa gca aaa ccg tcc tac cct ccg acc tat aag gct      384
Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala
      115      120      125
aaa ccg agt tac ccc ccg act tac aaa      411

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Lys Pro Ser Tyr Pro Pro Thr Tyr Lys
130 135

<210> 12
<211> 137
<212> PRT
<213> Artificial Sequence

<400> 12
Ser Ser Glu Gly Tyr Lys Gly Gly Tyr Tyr Pro Gly Asn Ser Asn His
1 5 10 15
Tyr His Ser Gly Gly Ser Tyr His Gly Ser Gly Tyr His Gly Gly Tyr
20 25 30
Lys Gly Lys Tyr Tyr Gly Lys Ala Lys Lys Tyr Tyr Tyr Lys Tyr Lys
35 40 45
Asn Ser Gly Lys Tyr Lys Tyr Leu Lys Lys Ala Arg Lys Tyr His Arg
50 55 60
Lys Gly Tyr Lys Lys Tyr Tyr Gly Gly Ser Ser Glu Phe Ala Lys Pro
65 70 75 80
Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr
85 90 95
Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr
100 105 110
Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala
115 120 125
Lys Pro Ser Tyr Pro Pro Thr Tyr Lys
130 135

<210> 13
<211> 591
<212> DNA
<213> Artificial Sequence

<220>
<223> Bioadhesive protein(mgfp-151) coding sequence

<220>
<221> CDS
<222> (1)..(591)
<223> Bioadhesive protein(mgfp-151)

<400> 13
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Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro
1 5 10 15
ccg act tat aag gct aaa cct agc tat cca cct acg tac aaa gct aaa 96
Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys
20 25 30
ccg tct tac ccg ccg act tac aaa gca aaa ccg tcc tac cct ccg acc 144
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Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	
		35					40				45					
tat	aag	gct	aaa	ccg	agt	tac	ccc	ccg	act	tac	aaa	agt	tct	gaa	gaa	192
Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ser	Ser	Glu	Glu	
	50					55					60					
tac	aag	ggg	ggg	tat	tac	cca	ggc	aat	tcg	aac	cac	tat	cat	tca	ggg	240
Tyr	Lys	Gly	Gly	Tyr	Tyr	Pro	Gly	Asn	Ser	Asn	His	Tyr	His	Ser	Gly	
	65				70					75					80	
ggg	agt	tat	cac	gga	tcc	ggc	tac	cat	gga	gga	tat	aag	gga	aag	tat	288
Gly	Ser	Tyr	His	Gly	Ser	Gly	Tyr	His	Gly	Gly	Tyr	Lys	Gly	Lys	Tyr	
			85						90					95		
tac	gga	aag	gca	aag	aaa	tac	tat	tat	aaa	tat	aaa	aac	agc	gga	aaa	336
Tyr	Gly	Lys	Ala	Lys	Lys	Tyr	Tyr	Tyr	Lys	Tyr	Lys	Asn	Ser	Gly	Lys	
			100					105					110			
tac	aag	tat	cta	aag	aaa	gct	aga	aaa	tac	cat	aga	aag	ggg	tac	aag	384
Tyr	Lys	Tyr	Leu	Lys	Lys	Ala	Arg	Lys	Tyr	His	Arg	Lys	Gly	Tyr	Lys	
	115					120						125				
aag	tat	tat	gga	ggg	agc	agt	gaa	ttc	gct	aaa	ccg	tct	tac	ccg	ccg	432
Lys	Tyr	Tyr	Gly	Gly	Ser	Ser	Glu	Phe	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	
	130					135					140					
acc	tac	aaa	gca	aaa	ccc	tcg	tac	cca	ccg	act	tat	aag	gct	aaa	cct	480
Thr	Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro	
	145				150					155				160		
agc	tat	cca	cct	acg	tac	aaa	gct	aaa	ccg	tct	tac	ccg	ccg	act	tac	528
Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	
			165						170					175		
aaa	gca	aaa	ccg	tcc	tac	cct	ccg	acc	tat	aag	gct	aaa	ccg	agt	tac	576
Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	
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Pro	Pro	Thr	Tyr	Lys												
			195													
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	1			5					10					15		
Pro	Thr	Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	
			20					25					30			
Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	
		35					40					45				
Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ser	Ser	Glu	Glu	
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Tyr	Lys	Gly	Gly	Tyr	Tyr	Pro	Gly	Asn	Ser	Asn	His	Tyr	His	Ser	Gly	

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65				70				75				80			
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Tyr	Gly	Lys	Ala	Lys	Lys	Tyr	Tyr	Tyr	Lys	Tyr	Lys	Asn	Ser	Gly	Lys
100				105				110							
Tyr	Lys	Tyr	Leu	Lys	Lys	Ala	Arg	Lys	Tyr	His	Arg	Lys	Gly	Tyr	Lys
115				120				125							
Lys	Tyr	Tyr	Gly	Gly	Ser	Ser	Glu	Phe	Ala	Lys	Pro	Ser	Tyr	Pro	Pro
130				135				140							
Thr	Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro
145				150				155							
Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr
165				170				175							
Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro	Ser	Tyr
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Pro	Pro	Thr	Tyr	Lys											
195															

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<210>      15
<211>      354
<212>      DNA
<213>      Artificial Sequence

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vector
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<220>
<221> CDS
<222> (1)..(351)
<223> Bioadhesive recombinant protein expressed in pMDG05 vector
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Met	Gly	Gly	Ser	His	His	His	His	His	His	His	Gly	Met	Ala	Ser	Met	Thr		
1				5						10					15			
ggg	gga	cag	caa	atg	ggg	cgg	act	ctg	cat	gac	gat	gac	gat	aag	gat			
Gly	Gly	Gln	Gln	Met	Gly	Arg	Thr	Leu	Tyr	Asp	Asp	Asp	Asp	Lys	Asp			96
			20					25					30					
cga	tgg	gga	tcc	gag	ctc	gag	atc	tgc	agc	agt	tct	gaa	gaa	tac	aag			
Arg	Trp	Gly	Ser	Glu	Leu	Glu	Ile	Cys	Ser	Ser	Ser	Glu	Glu	Tyr	Lys			144
		35				40						45						
ggg	ggt	tat	tac	cca	ggc	aat	ctg	aac	cac	tat	cat	tca	ggg	ggg	agt			
Gly	Gly	Tyr	Tyr	Pro	Gly	Asn	Ser	Asn	His	Tyr	His	Ser	Gly	Gly	Ser			192
		50				55					60							
tat	cac	gga	tcc	ggc	tac	cat	gga	gga	tat	aag	gga	aag	tat	tac	gga			
Tyr	His	Gly	Ser	Gly	Tyr	His	Gly	Gly	Tyr	Lys	Gly	Lys	Tyr	Tyr	Gly			240
65					70					75					80			

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aag gca aag aaa tac tat tat aaa aac agc gga aaa tac aag 288
Lys Ala Lys Lys Tyr Tyr Lys Tyr Lys Asn Ser Gly Lys Tyr Lys
85 90 95

tat cta aag aaa gct aga aaa tac cat aga aag ggt tac aag aag tat 336
Tyr Leu Lys Lys Lys Ala Arg Lys Tyr His Arg Lys Gly Tyr Lys Lys Tyr
100 105 110

tat gga ggt agc agt taa 354
Tyr Gly Gly Ser Ser
115

<210> 16
<211> 117
<212> PRT
<213> Artificial Sequence

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35 40 45

Gly Gly Tyr Tyr Pro Gly Asn Ser Asn His Tyr His Ser Gly Gly Ser
50 55 60

Tyr His Gly Ser Gly Tyr His Gly Gly Tyr Lys Gly Lys Tyr Tyr Gly
65 70 75 80

Lys Ala Lys Lys Tyr Tyr Tyr Lys Tyr Lys Asn Ser Gly Lys Tyr Lys
85 90 95

Tyr Leu Lys Lys Ala Arg Lys Tyr His Arg Lys Gly Tyr Lys Lys Tyr
100 105 110

Tyr Gly Gly Ser Ser
115

<210> 17
<211> 456
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pMDG150 vector

<220>
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<222> (1)..(453)
<223> Bioadhesive recombinant protein expressed in pMDG150 vector

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Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	
			20					25					30			
tat	aag	gct	aaa	cct	agc	tat	cca	cct	acg	tac	aaa	gct	aaa	ccg	tct	144
Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro	Ser	
		35					40					45				
tac	ccg	ccg	act	tac	aaa	gca	aaa	ccg	tcc	tac	cct	ccg	acc	tat	aag	192
Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	
	50					55				60						
gct	aaa	ccg	agt	tac	ccc	ccg	act	tac	aaa	ggc	tgc	agt	tct	gaa	gaa	240
Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Gly	Cys	Ser	Ser	Glu	Glu	
65					70					75				80		
tac	aag	ggt	ggt	tat	tac	cca	ggc	aat	tcg	aac	cac	tat	cat	tca	ggt	288
Tyr	Lys	Gly	Gly	Tyr	Tyr	Pro	Gly	Asn	Ser	Asn	His	Tyr	His	Ser	Gly	
			85					90						95		
ggt	agt	tat	cac	gga	tcc	ggc	tac	cat	gga	gga	tat	aag	gga	aag	tat	336
Gly	Ser	Tyr	Gly	Gly	Ser	Gly	Tyr	His	Gly	Gly	Tyr	Lys	Gly	Lys	Tyr	
			100					105					110			
tac	gga	aag	gca	aag	aaa	tac	tat	tat	aaa	tat	aaa	aac	agc	gga	aaa	384
Tyr	Gly	Lys	Ala	Lys	Lys	Tyr	Tyr	Tyr	Lys	Tyr	Lys	Asn	Ser	Gly	Lys	
		115					120					125				
tac	aag	tat	cta	aag	aaa	gct	aga	aaa	tac	cat	aga	aag	ggt	tac	aag	432
Tyr	Lys	Tyr	Leu	Lys	Lys	Ala	Arg	Lys	Tyr	His	Arg	Lys	Gly	Tyr	Lys	
	130					135					140					
aag	tat	tat	gga	ggt	agc	agt			taa							456
Lys	Tyr	Tyr	Gly	Gly	Ser	Ser										
145					150											
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<211>	151															
<212>	PRT															
<213>	Artificial Sequence															
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Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	
			20					25					30			
Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro	Ser	
		35					40					45				
Tyr	Pro	Pro	Thr	Tyr	Lys	Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	
	50					55				60						
Ala	Lys	Pro	Ser	Tyr	Pro	Pro	Thr	Tyr	Lys	Gly	Cys	Ser	Ser	Glu	Glu	
65					70					75				80		
Tyr	Lys	Gly	Gly	Tyr	Tyr	Pro	Gly	Asn	Ser	Asn	His	Tyr	His	Ser	Gly	
			85					90						95		

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Gly Ser Tyr His Gly Ser Gly Tyr His Gly Gly Tyr Lys Gly Lys Tyr
 100 105 110
 Tyr Gly Lys Ala Lys Lys Tyr Tyr Tyr Lys Tyr Lys Asn Ser Gly Lys
 115 120 125
 Tyr Lys Tyr Leu Lys Lys Ala Arg Lys Tyr His Arg Lys Gly Tyr Lys
 130 135 140
 Lys Tyr Tyr Gly Gly Ser Ser
 145 150

<210> 19
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<220>
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 pMDG051 vector

<220>
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 <222> (1)..(537)
 <223> Bioadhesive recombinant protein expressed in pMDG051 vector

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 ggt gga cag caa atg ggt cgg act ctg tac gac gat gac gat aag gat 96
 Gly Gly Gln Gln Met Gly Arg Thr Leu Tyr Asp Asp Asp Lys Asp
 20 25 30
 cga tgg gga tcc gag ctc gag atc tgc agc agt tct gaa gaa tac aag 144
 Arg Trp Gly Ser Glu Leu Glu Ile Cys Ser Ser Ser Glu Glu Tyr Lys
 35 40 45
 ggt ggt tat tac cca ggc aat tcg aac cac tat cat tca ggt ggt agt 192
 Gly Gly Tyr Tyr Pro Gly Asn Ser Asn His Tyr His Ser Gly Gly Ser
 50 55 60
 tat cac gga tcc ggc tac cat gga gga tat aag gga aag tat tac gga 240
 Tyr His Gly Ser Gly Tyr His Gly Gly Tyr Lys Gly Lys Tyr Tyr Gly
 65 70 75 80
 aag gca aag aaa tac tat tat aaa tat aaa aac agc gga aaa tac aag 288
 Lys Ala Lys Lys Tyr Tyr Tyr Lys Tyr Lys Asn Ser Gly Lys Tyr Lys
 85 90 95
 tat cta aag aaa gct aga aaa tac cat aga aag ggt tac aag aag tat 336
 Tyr Leu Lys Lys Ala Arg Lys Tyr His Arg Lys Gly Tyr Lys Lys Tyr
 100 105 110
 tat gga ggt agc agt gaa ttc gct aaa ccg tct tac ccg ccg acc tac 384
 Tyr Gly Gly Ser Ser Glu Phe Ala Lys Pro Ser Tyr Pro Pro Thr Tyr
 115 120 125

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Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala
145 150 155 160

aaa ccg tcc tac cct ccg acc tat aag gct aaa ccg agt tac ccc ccg 528
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35 40 45

Gly Gly Tyr Tyr Pro Gly Asn Ser Asn His Tyr His Ser Gly Gly Ser
50 55 60

Tyr His Gly Ser Gly Tyr His Gly Gly Tyr Lys Gly Lys Tyr Tyr Gly
65 70 75 80

Lys Ala Lys Lys Tyr Tyr Tyr Lys Tyr Lys Asn Ser Gly Lys Tyr Lys
85 90 95

Tyr Leu Lys Lys Ala Arg Lys Tyr His Arg Lys Gly Tyr Lys Lys Tyr
100 105 110

Tyr Gly Gly Ser Ser Glu Phe Ala Lys Pro Ser Tyr Pro Pro Thr Tyr
115 120 125

Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr
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tat aag gct aaa cct agc tat cca cct acg tac aaa gct aaa ccg tct      144
Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser
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tac ccg ccg act tac aaa gca aaa ccg tcc tac cct ccg acc tat aag      192
Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys
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gct aaa ccg agt tac ccc ccg act tac aaa ggc tgc agt tct gaa gaa      240
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Tyr Gly Lys Ala Lys Lys Tyr Tyr Tyr Lys Tyr Lys Asn Ser Gly Lys
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Lys Tyr Tyr Gly Gly Ser Ser Glu Phe Ala Lys Pro Ser Tyr Pro Pro
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acc tac aaa gca aaa ccc tcg tac cca ccg act tat aag gct aaa cct      528
Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro
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agc tat cca cct acg tac aaa gct aaa ccg tct tac ccg ccg act tac      576
Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr
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642

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35 40 45
Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys
50 55 60
Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Gly Cys Ser Ser Glu Glu
65 70 75 80
Tyr Lys Gly Gly Tyr Tyr Pro Gly Asn Ser Asn His Tyr His Ser Gly
85 90 95
Gly Ser Tyr His Gly Ser Gly Tyr His Gly Gly Tyr Lys Gly Lys Tyr
100 105 110
Tyr Gly Lys Ala Lys Lys Tyr Tyr Tyr Lys Tyr Lys Asn Ser Gly Lys
115 120 125
Tyr Lys Tyr Leu Lys Lys Ala Arg Lys Tyr His Arg Lys Gly Tyr Lys
130 135 140
Lys Tyr Tyr Gly Gly Ser Ser Glu Phe Ala Lys Pro Ser Tyr Pro Pro
145 150 155 160
Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro
165 170 175
Ser Tyr Pro Pro Thr Tyr Lys Ala Lys Pro Ser Tyr Pro Pro Thr Tyr
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